ation, therefore, being so soon interrupted, the string soon became so bad that it acted nothing better than common twine without a wire. I attempted to mend it by joining the broken pieces of wire, and working into the twine another wire, which proved a very laborious work, but the remedy had very little effect, the wire breaking again after the first trial, which determined me to adopt other methods, and, after several experiments I found that the best string was one which I made by twisting a copper thread[1] with two very thin threads of twine. Strings like this I have used for the greatest part of my experiments with the kite, and I find them to be exceedingly useful and fit for the purpose. Silver or gold threads would do much better to twist with the twine because they are much thinner than copper thread, and in consequence, the string would be much lighter, but at the same time it is to be considered that gold or silver thread is much dearer than copper thread.

I have attempted to render the twine a good conductor of electricity by covering it with conducting substances, as lamp black, powder of charcoal, very fine emery, and other substances, mixing them with diluted gum water; but this method improves the string very little, and for a short time, for the said conducting substances are soon rubbed off the twine. Mr. Nairne informed me that he used to soak the string of his electrical kite in a strong solution of salt, which rendered it a good conductor, so far as it attracted the moisture of the air. In consequence of this information I soaked in salt water a long piece of twine, and by raising a kite with it I found that it conducted the electricity pretty well, but I thought it much inferior to the above-described string with the copper thread, besides the salted string in wet weather not only leaves part of the salt upon the hands of the operator, and in consequence renders them unfit to manage the rest of the apparatus, but it marks a white spot wherever it touches the clothes.

In raising the kite when the weather is very cloudy and rainy, in which time there is fear of meeting with great quantity of electricity, I generally use, to hang upon the string, the hook of a chain, the other extremity of which falls upon the ground. Sometimes I use another caution besides, which is to stand upon an insulating stool, in which situation I think that if any great quantity of electricity, suddenly discharged by the clouds, strikes the kite, it can not much affect my person. As to insulated reels and such like instruments that some gentlemen have used to raise the kite without danger of receiving any shock, fit for the purpose as they may appear to be in theory, they are yet very inconvenient to be managed. Except the kite be raised in time of a thunderstorm, there is no great danger for the operator to receive any shock. Although I have raised my electrical kite hundreds of times without any caution whatever, I have very seldom received a few exceedingly slight shocks in my arms. In time of a thunderstorm, if the kite has not been raised before, I would not advise a person to raise it while the stormy clouds are just overhead, the danger in such time being very great, even with the precautions above mentioned. At that time, without raising the kite, the electricity of the clouds may be observed by a cork-ball electrometer held in the hand in an open place, or, if it rains, by my electrometer for the rain, which will be described hereafter.

The experiments made by Cavallo with the above kite are given in full from September 2, 1775, to January 8, 1777, from which we cull only the following: He demonstrates that it was the string and not the kite that collects the electricity from the air, and, again, that for the same length of string the index of his electrometer rose higher in proportion as the kite came nearer to the zenith, but the angular distance from the zenith is not given, so that we can not infer anything as to the angle of efficiency of his kites.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Senor Mariano Bárcena, director, and Senor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the summaries of Mexican data for the months of January and February have been communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW during 1896. The altitudes occasionally differ from those heretofore published, but no reason has been assigned for these changes. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart III.

[1] I mean such a thread of copper as is used for trimmings, etc., in imitation of gold threads, which are nothing more than silk or linen threads covered with a thin lamina of copper.

Mexican data for January, 1897.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	*° F.*	*° F.*	*° F.*	*%*	*Inch.*		
Aguascalientes	6,112	23.80	73.4	35.6	55.4	50	4.72	n.	sw.
Campeche									
Colima (Seminario)	1,663				73.2				
Colima									
Culiacan	112								
Guadalajara (O. d. E.)	5,141	24.98	79.9	34.2	57.7	86	0.19	nnw.	w.
Guanajuato	6,761								
Jalapa	4,757	25.56	88.2	41.5	57.7	85	2.98	n.	
Lagos (L. G.)	6,275	24.14	77.9	28.7	55.0	57	0.63	sw.	sw.
Leon	5,901	24.30	76.8	34.3	56.8	50	0.50	ssw.	sw.
Magdalena (Sonora)	4,948				52.3		6.46	s.	w.
Mazatlan	25								
Merida	50	30.01	91.2	54.5	72.0	74	2.95	ne.	se.
Mexico (Obs. Cent.)	7,472	23.06	74.5	37.0	55.9	49	0.15	sw.	sw.
Mexico (E. N. de S.)	7,480								
Monterey	1,626	28.24	77.0	23.9	55.4	77	1.44	ne.	ne.
Morelia (Seminario)	6,401	23.96	75.1	37.4	55.6	63	0.72	ssw.	w.
Oaxaca	5,164	25.10	82.6	39.4	63.3	56	T.	nw.	
Pabellon	6,312								
Pachuca	7,956	22.54	80.2	34.9	54.0	59	0.22	nne.	sw.
Puebla (Col. d. Est)	7,118								
Puebla (Col. Cat.)	7,112	23.38	76.1	39.9	56.8	46	0.04	ese.	sw.
Queretaro	6,070								
Real del Monte	9,095								
Saltillo (Col. S. Juan)	5,377	24.89	74.8	21.2	50.4	67	3.66	n.	n.
San Jacinto (E.N.d.A.)	7,438								
San Luis Potosi	6,202	24.13	73.0	37.4	54.1	68	1.04	sw.	w.
Silao	6,063	24.28	72.7	44.8	59.0	62	0.44		
Tacámbaro									
Tacubaya (Obs. Nac.)	7,620								
Tampico (Hos. Mil.)	38								
Tehuacan	5,453								
Toluca	8,812	21.89	71.4	31.6	50.2	54	0.33	se.	
Trejo (H. de, S., Gto.)*	6,011						0.46		
Trinidad †	6,011								
Veracruz	48								
Zacatecas	8,015	23.49	75.2	29.8	51.8	52	1.24	sw.	sw.
Zapotlan (Seminario)	5,125	25.08	80.6	44.4	62.4	62	0.42	se.	sw., se.

* Trejo appears to have the same altitude as the next station, Trinidad, but this may be a typographical error as in the December *Boletin*. See MONTHLY WEATHER REVIEW, January, 1897, page 17.

† Trinidad is 14 kilometers east-southeast of Leon.

Mexican data for February, 1897.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	*° F.*	*° F.*	*° F.*	*%*	*Inch.*		
Aguascalientes	6,112								
Campeche									
Colima (Seminario)	1,663	28.29	96.4	46.8	72.1	61	0.03	wsw.	sw.
Colima					74.8				
Culiacan	112	29.81	90.1	50.0	60.7	58	0.00		
Guadalajara (O. d. E.)	5,141	24.98	87.3	35.8	62.4	79	0.00	sw.	sw.
Guanajuato	6,761								
Jalapa	4,757	25.52	77.0	55.4	64.6	72	0.72	se.	
Lagos (L. G.)	6,275	24.13	87.8	30.2	59.0	42	T.	nw.	sw.
Leon	5,901	24.29	84.2	34.7	60.4	36	T.	sw.	sw.
Magdalena (Sonora)	4,948				54.9		0.24	n.	n.
Mazatlan	25	29.96	77.4	54.9	69.8	70	0.00	nw.	sw.
Merida	50	29.94	95.2	53.6	77.0	70	0.03	se.	se.
Mexico (Obs. Cent.)	7,472	23.06	73.9	46.9	60.1	41	0.00	se.	sw.
Mexico (E. N. de S.)	7,480								
Monterey	1,626	28.09	95.0	41.0	65.8	59	T.	ne.	ne.
Morelia (Seminario)	6,401	23.96	85.8	38.5	61.9	52	0.00	ssw.	wsw.
Oaxaca	5,164	25.06	90.0	42.2	67.5	55	0.00	nw.	ne.
Pabellon	6,312								
Pachuca	7,956								
Progreso									
Puebla (Col. d. Est.)	7,118								
Puebla (Col. Cat.)	7,112	23.37	83.3	38.8	61.0	44	0.00	e.	sw.
Queretaro	6.070								
Real del Monte	9,095								
Saltillo (Col. S. Juan)	5,377	24.78	85.3	37.7	58.3	50	0.04	s.	sw.
San Jacinto (E.N.d.A.)	7,438	23.05	72.1	37.8	59.5	47	0.00	sw.	n. w.
San Luis Potosi	6,202	24.11	81.5	39.6	60.8	63	T.	sw.	w.
Silao	6,063	24.28	79.7	43.3	62.8	50	T.	nw.	sw.
Tacambaro									
Tacubaya (Obs. Nac.)	7,620								
Tampico (Hos. Mil.)	38								
Tehuacan	5,453								
Toluca	8,812	21.93	76.6	28.6	54.5	48	0.00	sw.	
Trejo (H. d. S., Gto.)	6,011						0.00		
Trinidad	6,011								
Vera Cruz	48								
Zacatecas	8,015	22.50	68.5	42.3	55.6	42	0.00	sw.	
Zapotlan (Seminario)	5,125	25.08	87.4	43.5	65.1	48	0.05	sse.	sw.

CHEMICAL COMPOSITION OF THE UPPER AIR.

The second series of simultaneous balloon ascensions in the interest of meteorology was carried out on the 18th of February. The balloon, L'Aerophile, which ascended at

Paris to a remarkable altitude, as it has done on several previous occasions, carried a special apparatus which was moved by clockwork and which allowed a vacuum chamber to be opened, filled with air, and closed when the balloon was at or near its maximum height. The volume of the reservoir was about 6 liters, the altitude at which it was filled was 15,500 meters; the barometric pressure recorded at the time of filling was 140 millimeters. The experiment appears to have been completely successful, every source of trouble in the apparatus having been anticipated and provided for. A complete description of the apparatus and results is given by M. Cailletet in the *Comptes Rendus*, of the Academy of Sciences, Paris, March 8, 1897, from which we take the following account of the results of the chemical analysis. This analysis was entrusted to Müntz, who reported that the volume of about 6 liters of air secured at 15,500 meters, at a pressure of 140 milimeters and a probable temperature of about minus 66°, occupied a volume of 1.18581 liter when reduced to the standard pressure of 760 mm. and a temperature of 0° C. 100 volumes of this air contained 0.033 volume of carbonic acid gas; after being deprived of its carbonic acid gas, 100 volumes of this air contained 20.79 of oxygen, 78.27 of nitrogen, 0.94 of argon. The ratio of the argon to the sum total of the nitrogen and argon was 0.01185. M. Müntz adds the following remarks:

The results of the above analysis show, as was to have been anticipated, that at the altitude attained in this case, the chemical composition of the air does not differ notably from that of the lower strata, but these figures can only be accepted with some reserve; it is, in fact, necessary to still further perfect the method of securing the specimen of air so as to avoid any possible alteration in its composition. It will be necessary to employ for the lubrication of the stop-cock a mineral oil incapable of absorbing the slightest trace of oxygen or of emitting a trace of carbonic acid gas under the conditions that prevail in these experiments. It will also be necessary to make use of a vacuum chamber whose walls do not absorb a single trace of oxygen. In this respect a reservoir of glass would be ideal, but a reservoir of gilded copper would seem to me to equally fulfill the desired object. In the present case it is possible that the small proportion of carbonic acid gas, 0.033 in excess over that of normal air, 0.029, is due to the oxidation of the lubricant which could have furnished the tenth of a milligram corresponding to this excess. In the same way the small proportion of oxygen, 20.79, as compared with that of normal air, 20.96, and which for the volume of air collected represents 3 milligrams, could be due to the absorption of this gas by the lubricator and, especially, by the metallic walls of the tinned copper.

After eliminating all possible causes of error in this latest ascension we can decide with certainty whether or not there exist any real differences in the constitution of the air at various altitudes. For the methods of analyses with gases are to-day so perfect, thanks, especially to the labors of M. T. Schloesing, Jr., that excessively small differences would be shown if they existed, but, as is easily perceived, the air in the regions where it is actually possible to explore the atmosphere by means of the sounding balloon is subject to the effect of a stirring which renders its composition sensibly uniform with that of the lower strata; one ought, therefore, to expect only small differences in its composition, such as can only be demonstrated with certainty when the most minute precautions are taken. It will be easy to take account of the errors that are attributable to the retention of the air in its reservoir by introducing into the latter some air of known composition which can be analyzed at the end of a certain interval.

The Editor hopes that the above cautious remarks by so high an authority in science will serve to correct the sensational paragraphs that have been going the rounds of the newspapers to the effect that the results of this high ascension demonstrated that the composition of the atmosphere varies with increased altitude in such a way as to prove that a definite limit to the atmosphere exists at no great altitude above the earth and that this limit is diminishing.

METEOROLOGICAL NOTES BY CAPT. WM. SCORESBY, JR.

(*A*) STATIONARY CLOUDS ON MOUNTAIN TOPS.

In his journal of a voyage to the northern whale fishery and east coast of West Greenland, 1822 (Edinburgh, 1823), Scoresby says that he was on the 5th of September off the Faroe Islands, and remarks:

The tops of the higher cliffs of Kalsoc and Ostroe, it was remarked, were capped with clouds, which remained in a state of apparently calm repose upon the summits, while a breeze, little short of a gale of wind, carried all other clouds along with great velocity. This is a circumstance so common in these islands, and, indeed, in all mountainous countries, that it would scarcely have merited observation had it not formerly suggested to me an explanation of the phenomenon of the suspension of clouds, which, as far as I know, is new.[1] The force acting against the suspension of clouds is gravity, which, on account of the resistance that very minute substances, such as the almost invisible particles of vapor in clouds, meet with in their descent from the air, can be productive of no great velocity; but the force acting against the retention of clouds on the tops of mountains in boisterous weather is the wind, which may have a velocity of 50 miles an hour or upwards. Hence, whatever cause is sufficient for the retention of clouds upon mountains against the action of the wind must be sufficient (all other circumstances being the same) for the suspension of clouds in the air, where the tendency to quit their position is induced by a force perhaps not one-tenth so great as the former. In the case of the retention of clouds upon mountains, it might be objected that, notwithstanding a gale may be blowing in the lower parts of the atmosphere, the air on the tops of the mountains may be calm. It must be admitted that the various currents known to exist in the atmosphere at the same time in different strata might justify this supposition were there no facts that could be brought forward to prove the prevalence of the wind aloft as well as below in instances where the clouds were retained. These facts, indeed, being so much within every person's observation who has visited mountainous countries, scarcely requires an example. Two instances, however, may be given: On a former voyage, when the highest summit of Ostroe was observed to be covered with a stationary cloud during a strong gale, the lower atmosphere was full of those scattered clouds called by the sailors "scud," whose flight in storms is so striking and rapid. Some of these patches of cloud were evidently at the same level as that of the highest land, because in a large patch passing across the summit it was sometimes observed that a portion of it coalesced with the cloud reposing thereon, and the rest flew away, with undiminished velocity, to leeward. The other example that I have to mention relates to Ben Lomond. I ascended this mountain on a fine, clear day, in the month of October. There were, indeed, some flying clouds in the air, the wind being high, but these were small and few. The summit of Ben Lomond, however, was capped with a stationary cloud. This cloud proved to be of the nature of mist of the densest kind. The particles of vapor were remarkably small and were flying rapidly past me by the action of the wind. At the very top, indeed, the gale was so strong that I could scarcely keep my feet; yet the cloud steadily maintained its position for several hours. Now, as the cloud could not possibly remain stationary on the mountain without moving to windward with a velocity equal to that of the gale, a notion which it would be absurd to entertain, its apparent fixedness can only be attributed to progressive deposition of aqueous vapor, or formation, on the one hand, and to equal solution and dispersion, on the other. It is, therefore, absolutely certain that the stationary appearance of the cloud, in this instance, was the effect of condensation produced on the air as it approached the mountain and absorption as it receded from it, so that while the cloud seemed to a distant observer to be the same mass of vapour, neither varying in size nor form for a quarter of an hour together, it was in reality changing the whole of the particles of which it consisted perhaps every minute.

(*B*) GALES WITH RISING BAROMETER.

The strongest winds that are experienced in the United States may, perhaps, be classified as follows:

(*a*) Very local gusts attending thunderstorms and tornadoes; these are generally believed to be whirling and ascending winds, but this is not invariably the case, since for every descending mass of air there must be a corresponding ascending mass; at or near the surface of the earth the destructive gusts are more likely to be descending.

(*b*) Severe whirlwinds, which are certainly revolving winds, and on a much larger scale than in the tornado.

(*c*) Local straight-line winds, which Hinrichs calls "derechos;" these usually attend cyclonic storms, and, apparently, consist of denser cool or dry air descending to the ground.

(*d*) Straight-line winds on a larger scale, known as "northers," "northwesters," or "blizzards," which are also cold, dry, heavy air pushing outward and especially southward from an area of high pressure, and, probably, also slowly descending.

[1] The first observation of this circumstance occurred in 1820, while passing the Faroe Islands in a gale of wind. The theory of the suspension of clouds that was suggested by it was first communicated to the Liverpool Society of Travelers into Foreign Countries about two years ago.